ABSTRACT TITLE: METROLOGY FOR SPATIAL INTERFEROMETRY II

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ABSTRACT:

Very high resolution spatial interferometry requires picometer level one-dimensional metrology, three-dimensional metrology and surface metrology. Micron level accuracy is required for absolute metrology systems for spacecraft carrying high resolution spatial interferometers .

We have developed a surface metrology system with an repeatability of 0.1 nm over an aperture of several inches in vacuum. We are in the process of developing an absolute calibration system for this gauge.

An absolute metrology system with an accuracy of 10 microns over a distance of 10 meters is also under construction. This system uses a stabilized (1 part in 10 to the tenth) 1.3 micron, solid-state infrared laser locked to a ULE cavity. The length of the cavity is cent.r-ol]ecl by a thermal vacuum oven. We achieved 1 mini-degree Centigrade rms stability with the oven in air for timescales of days. We expect to get better results when the oven is evacuated.

An auto alignment. system is being developed for our linear relative metrology gauge which achieved an accuracy of 0.1 picometers. This gauge will be used to construct a 3-dimensional metrology gauge.

The research described is performed at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

BRIEF BIOGRAPHY:

The author is a member of the technical staff in the Spatial Interferometry group of the Coherent Instruments and Large Optical Systems section at JPL. After getting his Ph. D. from Caltech, he has worked in the Gravitational Physics Group at. Caltech, in the Artificial Intelligence Laboratory at MIT and in the LIGO Project at Caltech as a Staff Scientist..